Indian J Pediatr (2010) 77:997–1004
DOI 10.1007/s12098-010-0131-0

Approach to a Child with Monoarthritis

A. S. Prabhu · Suma Balan

Received: 19 July 2010 / Accepted: 26 July 2010 / Published online: 7 September 2010

Abstract Arthritis in childhood is common. The pattern, presentation and duration of arthritis help differentiate between the various possible diagnoses. When only one joint is involved, i.e., monoarthritis, it may be difficult to make a diagnosis as there are many possibilities both acute and chronic in nature. A detailed history and clinical examination is important to reach a correct diagnosis and the single most important investigation when a child presents acutely is a joint aspiration to rule out septic arthritis that may destroy the joint in hours. Inflammatory markers, antinuclear antibody testing, test for tuberculosis and imaging (in specific cases) play an important role in the diagnosis of a child that presents with a chronic monoarthritis. In this article we provide a clinical approach to the diagnosis of monoarthritis in a child.

Keywords Monoarthritis · Arthralgia · Joint swelling · Children

Arthritis in childhood is common with monoarthritis being more common than polyarthritis. It may be acute or chronic.

Definitions

What is acute monoarthritis?

Acute monoarthritis is inflammation of one joint only, characterized by pain, swelling, warmth, redness, and/or limitation of movement with duration of less than 3 weeks [1].

What is chronic monoarthritis?

Whilst there is no exact definition of chronic monoarthritis, it is generally considered that arthritis lasting at least 6 weeks in one joint only is chronic.

Causes

There are several causes of a single joint being swollen. The common causes of acute and chronic monoarthritis are listed below.

Acute Monoarthritis

1. Septic arthritis
2. Reactive arthritis including the initial presentation of acute rheumatic fever and post infectious arthritides
3. Hemarthrosis
4. Traumatic joint effusion
5. Bone tumours and acute leukemia
6. Juvenile arthritis (systemic onset or enthesitis related subcategories)

Chronic Monoarthritis

1. Juvenile arthritis (systemic onset, oligoarticular and the ERA subcategories.)
2. Chronic hemarthrosis
3. Malignancies/bone tumors
4. Infections such as tuberculosis
5. Miscellaneous disorders e.g., sarcoidosis, pigmented villonodular synovitis.

The key point to note is that the child who presents acutely needs urgent care to exclude septic arthritis that can destroy the joint within hours whereas, the child who has an insidious onset of monoarthritis may be reviewed in the outpatient setting and be comprehensively worked up as per the clinical

A. S. Prabhu · S. Balan (✉)
Department of Pediatrics, Amrita Institute of Medical Sciences,
Amrita Institute of Health Sciences,
P.O Elamakkara, Kochi, India
e-mail: sumabalan@hotmail.com

picture. The causes of acute and chronic monoarthritis are not "water tight compartments" and occasionally a child with systemic onset JIA may present with fever and a single swollen joint acutely or a child with hemophilia may present for the first time with a chronic monoarthritis as a teenager. It is for these reasons that children who present with monoarthritis are often a challenge to manage.

Acute Monoarthritis

How do we start when trying to diagnose monoarthritis? (Figure 1)

A good history is pivotal. The key points to focus upon are:

1. Is the child 'well' or 'sick'?
2. Is there a history of possible trauma?
3. Are there features that would suggest infection, either localised or systemic?
4. Is there a family history of bleeding diathesis?
5. What is the nature of the onset? A sudden onset of swelling or pain developing over minutes or hours is suggestive of trauma. In younger children, the possibility of non-accidental injury must be considered [2]. A history of trauma does not exclude joint infection since trauma in children is very common, and an infected joint will be more sensitive to even minor trauma. If trauma is the cause of the joint effusion there would be a history of significant injury immediately preceding the swelling and there may be bruising on the skin as well. An acute onset of a single joint being swollen over hours or days is suggestive of septic joint, reactive arthritis, hemarthrosis or acute rheumatic fever.
6. Are there constitutional features? The history should include complaints of fever, sore throat, weight loss, loss of appetite, diarrhea, urethral discharge, history of sexual activity, history suggestive of uveitis, rash etc. as they are all pointers to relevant diagnoses. Important causes of a child who presents with monoarthritis and fever are listed in Table 1.
7. What is the nature of pain and/or stiffness? e.g., Night pain that disturbs sleep suggests osteomas or malignancies. The presence of early morning stiffness, improvement with gentle mobility and a fluctuant course is characteristic of inflammatory arthritis. Pain that is more in the evenings is not associated with early morning stiffness and worsens after movement or with exercise suggests mechanical pain.
8. Is there a history of medications being taken? Long term steroids can cause avascular necrosis; retinoids can cause monoarthritis; anticonvulsants can unmask the articular manifestation of lupus [2].

Examination

General Examination In acute monoarthritis, the initial aim is to distinguish between the toxic ill child with a systemic infection/septic arthritis, the child with joint swelling due to trauma, and the relatively 'well' child due to other causes. The important causes of fever and an acute monoarthritis are listed in Table 1.

A detailed exam with a focus on rashes, palpable purpura, peeling of the skin, thickening of the skin, conjunctivitis, icterus, lymphadenopathy, nail pitting, pigmentation, psoriasis, oral ulcers, nodules etc can provide clues to the underlying diagnosis.

A systemic examination with emphasis on tachycardia/murmurs, presence of chest infection, or hepatosplenomegaly is important. Thorough evaluation of the musculoskeletal system is needed. One should inspect for swelling, redness and soft tissue involvement. A skilled clinical examination can distinguish an articular disease from periarticular pathology. In addition it is important to examine all joints to confirm that the child does not have a polyarticular disease with one joint that is the most bothersome. This would have a different clinical approach altogether. The nature of the joint swelling is important as there are few causes for a red hot swollen joint with marked restriction of joint movement: Sepsis, bleed or the initial joint involvement in acute rheumatic fever. An inflamed joint with mild warmth and discomfort but no acute pain on movement would on the other hand suggest an aseptic inflammatory process. This is seen in children with an acute onset of reactive arthritis, but sometimes the latter may simulate a septic joint.

Enthesitis should be specifically sought by examination of the entheses especially the tendo-achilles and the quadriceps insertion.

Investigations

History and examination should help reach a list of probable differential diagnoses which can be confirmed by relevant investigations.Complete blood count (CBC) with peripheral smear

I. Laboratory investigations:
   A. ESR, CRP
   B. Coagulation studies
   C. Blood culture
   D. Viral titers
   E. Anti streptolysin O titre: ASO titre
   F. Throat swab
   G. Tuberculin test
II. Radiological evaluation: Are helpful for children who present with monoarthritis.

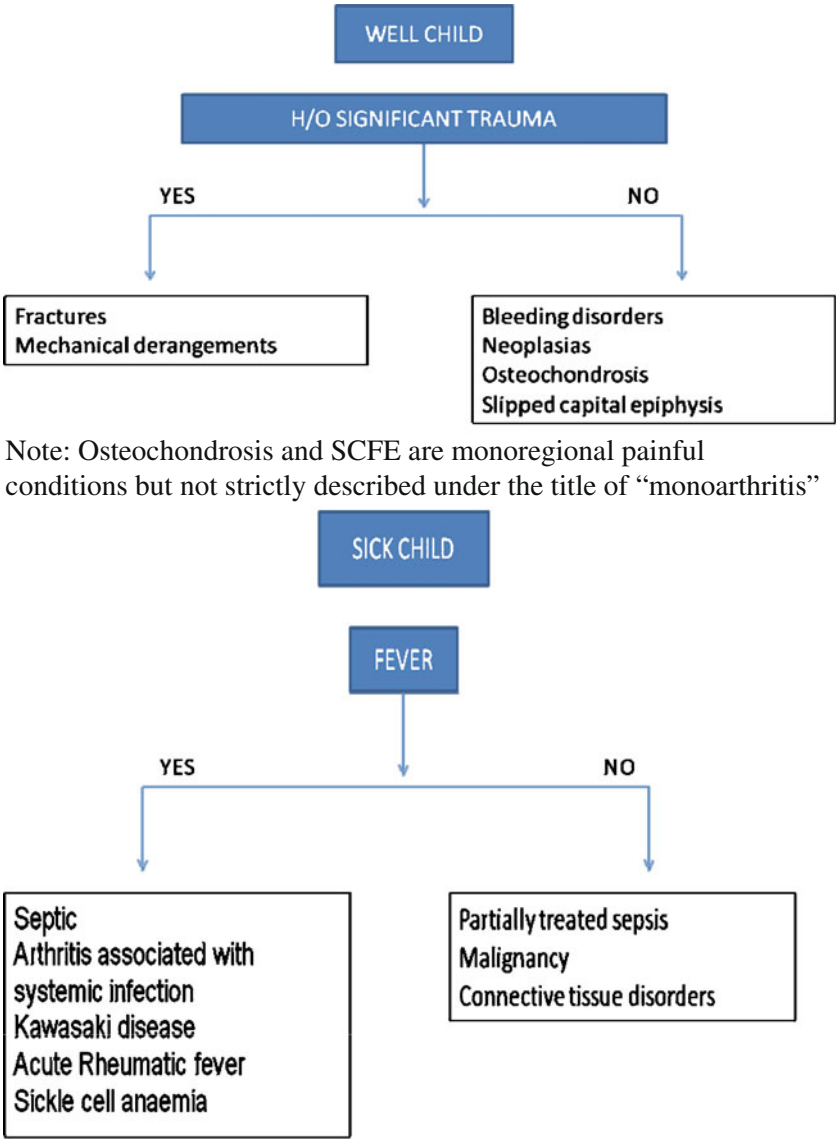

Figure 1 Acute monoarthritis

III. X- ray of the involved joint: Shows widening of joint space if effusion is present; however, effusions are best determined by clinical examination and plain x-rays should not be relied upon to define effusions. Importantly, x-rays in acute arthritis can usually be normal. Also, other features of injury can be picked up, as can features of osteochondritis / avascular necrosis /foreign bodies in the joints. A plain x-ray may define bone pathology in the adjacent bone, such as a malignancy. Whilst this is rare in childhood, it can be almost silent clinically, and therefore any mono-arthritis that has been present for more than 6 weeks, where there are no other clinical signs or abnormal investigations should have a plain x-ray to exclude isolated bone pathology of serious nature. A clinician needs to be caught out only once, when a malignancy

Table 1 What is the relevance of fever in a child with acute monoarthritis?

H/O fever in association with monoarthritis is significantly associated with
Septic arthritis
Systemic infection with arthritis(Leptospirosis, Viral illness etc)
Haematological malignancy can present as sick child with joint pain or arthritis
Systemic illnesses like Kawasaki's disease/ Acute Rheumatic fever

has been overlooked, to learn the lesson of the value of a simple x-ray for chronic monoarthritis.

IV. Ultrasound of the joint: Is helpful both for diagnosis of effusion and for diagnostic aspiration of difficult to reach joints such as the hip joint. Ultrasound in experienced hands is very useful in monoarthritis of a hip to define the presence of an effusion.

V. MRI will show features of synovitis/effusion/ bone edema osteomyelitis/tumor and can be very helpful if the clinical picture is not clear. It is especially useful to help take a decision for joint aspiration in a child with overlying cellulitis.

VI. Echocardiography: May assist in the diagnosis of the child with suspected Acute Rheumatic fever.

What are The Common Causes, Management and Outlook for Acute Monoarthritis?

Pyogenic Arthritis [3]

Septic arthritis in infancy and childhood is a true clinical emergency.

Delay in the diagnosis and treatment of septic arthritis can result in disastrous complications including complete destruction of the articular cartilage and epiphysis, loss of the growth plate, and joint dislocation.

Prompt treatment will cure and avoid above sequel.

Aetiology In all age groups the most common infecting organism is Staphylococcus aureus. Other important organisms that cause septic arthritis are the *Streptococcus species, Pseudomonas aeruginosa*, *Pneumococci, Neisseria meningitidis* (with or without associated meningitis), *Escherichia coli, Klebsiella species*, and *Enterobacter species/Kingella kingae*. Gonococcus may be implicated in newborns *via* an infected birth canal, in sexually active teenagers and may be seen also in younger children in association with sexual abuse [4].

Onset of fever, malaise, and prominent localizing signs such as erythema, local heat and significant pain at the affected joint are all suggestive of a septic joint. These clinical features are less obvious when deep joints such as the hip are involved. The most consistent sign is pain with passive motion. The patient will generally hold the joint in the position that maximizes intracapsular volume. Occasionally the child may have pseudo paralysis, mimicking a neurological problem.

Investigations will show raised inflammatory markers and an effusion on USS/MRI, though this will have been previously defined on clinical examination in most cases. The joint aspiration and culture are confirmatory. It should be remembered that occasionally fluid from the joint in septic arthritis may not grow a bacterial organism, in which case, clinical suspicion will dictate that the child be treated as having septic arthritis. Blood cultures should be obtained if possible to further confirm the presence of bacterial infection.

Septic arthritis requires initial broad spectrum intravenous antibiotics following joint aspiration and blood cultures which can be modified per the sensitivity reports. Total recommended antibiotic course is for at least 6 weeks.

Most patients have favourable outcomes with sequential parenteral and then oral antibiotic therapy after adequate surgical débridement of the infection. Close outpatient follow-up is essential to ensure antibiotic compliance and to identify late consequences of the infection [5].

Transient Synovitis of the Hip

Seen usually in young toddlers and up to 8 years, there is sudden onset pain/limp in a unilateral hip with restriction of range of movement. Usually a well child with a history of mild upper respiratory infection in the recent past would present with a painful limp. Baseline investigations are usually unremarkable and there is only a modest elevation of the ESR. This is a diagnosis of exclusion and a septic hip is an important differential where the child is toxic, febrile and has a significant pain with marked elevation of the inflammatory parameters. If in doubt the joint must be aspirated. Transient synovitis of the hip joint settles with simple analgesia in 24–48 h, needs rest and non steroidal anti-inflammatory therapy for two to 3 weeks and may sometimes recur [6].

Reactive Arthritis Secondary to infection with enteric organisms is relatively common, occasionally causing a monoarthritis affecting lower limbs. The common organisms that can cause a reactive arthritis are Shigella, Salmonella and Campylobacter. The arthritis can be very painful, usually relatively short-lived. The presence of HLA-B27 in the patient and a family history of spondyloarthropathy appear to increase the risk of developing an arthritis that is more severe and prolonged [7]. Arthritis, urethritis and acute conjunctivitis are well described to occur together. (Reiter's syndrome)

Post Streptococcal Disease Post Streptococcal reactive arthritis (PSRA) and acute Rheumatic fever (ARF).

Though both these clinical syndromes usually present with multiple joint involvement, monoarticular presentation has been occasionally described [8]. In acute rheumatic fever the involved joint is acutely painful and has overlying erythema. The pattern of joint disease is fleeting in ARF

and one joint is usually not involved for more than a wk. The joint disease is more sustained in PSRA resolves over 6–8 weeks and has a less dramatic response to NSAIDs as compared to ARF. Long term articular outlook for both forms is excellent and currently Penicillin prophylaxis is recommended for both conditions.

Arthritis as Part of Systemic Illness

This is an important consideration and needs careful evaluation. The two areas that often needing screening are : i) A screen for Systemic infections: Leptospirosis, Brucellosis, Mycoplasma, Hepatitis B &C, Enteroviral and Arboviral infections such as Chikungunya fever are some of the important infections that may have arthritis, though it is seldom a monoarthritis. These infections are screened for in patients with a relevant history of exposure to geographic areas where such infections are prevalent. ii.) Systemic vasculitic illnesses: In Kawasaki disease and Henoch Schnolein Purpura monoarticular presentation is described though less typical. Most often these children have large joint involvement of the lower limbs with angioedema over the hands and feet.

The outlook depends on recovery from the underlying condition, the arthritis usually responds to the treatment of the underlying condition and NSAIDs.

Malignancy Diffuse hematological malignancy (leukemia, lymphoma) as well as localised osseous malignancy (osteosarcoma/ Ewing's) can present as joint pain [9]. The symptoms of arthritis, sometimes with a migratory pattern can precede hematological features of malignancy by months.

The red flag signs are that the child is usually sick and may have bone pain, night pain and/or back pain. Clinical examination reveals an unwell child with arthritis and often periarthritis. Additional features that point to the diagnosis of a malignancy are pallor, hepatosplenomegaly, lymphadenopathy and bony tenderness.

A CBC will often show abnormalities of all three cell lines or an elevated ESR in the presence of low or normal platelet count. X-rays may show periosteal reactions and other features of bony malignancy.

Mechanical Causes [10]

Monoregional acute pain and limitation of movement, for instance pain around the knee, in the hip or groin, the heel or around the elbow may be due to mechanical causes such as Osgood-Schlatter syndrome which is a painful condition caused by irritation and sometimes fragmentation at the tibial tuberosity. It is an e.g., of apophysitis of the immature skeleton subjected to too much physical exercise causing pull on the tibial tubercle that sits adjacent to a growth plate.

SCFE (Slipped Capital Femoral Epiphyses) occurring in adolescent /preadolescent boys can present with hip pain/ knee pain (due to radiation from hip). Perthes' disease or Avascular Necrosis of head of femur is classically seen in toddlers and early childhood. It affects boys more than girls, and presents as a painful limp.

A detailed history and clinical examination reveal that the problem is mechanical and there is in addition no arthritis on examination. These conditions are thus painful, involve a joint, may present acutely, but do not have frank arthritis and will not be discussed here.

Hemarthrosis [11] is suspected in a child, especially a male infant who has significant bruising after trivial trauma, large hematomas after vaccination or spontaneous large articular swellings that begin abruptly and are very painful especially when there is a family history of a bleeding diathesis. The most common diagnosis in this category is hemarthrosis. Appropriate management of the coagulation abnormality is required for resolution. Recurrent hemarthrosis can damage the joint and lead to chronic arthropathy needing synovectomy and or joint replacement in the long term. An aggressive factor replacement therapy that is prophylactic in nature and helps prevent joint bleeds with appropriate physiotherapy to strengthen the muscles is the key to the best outcome for these patients. It has been shown that children who are under the care of an appropriate tertiary centre, benefit from washout of hemarthroses early on, and instillation of corticosteroid, to prevent the development of chronic changes in the effected joint, particularly by reducing the inflammation occurring and thereby the number of hemarthroses occurring in the particular joint.

Chronic Monoarthritis of Childhood

Initial Management

The importance once again is to distinguish between the sick and well child and identify for presence of other pointers of chronic disease.

Some conditions already described can present as either as acute or chronic monoarthritis such as hemarthrosis, some subcategories of JIA and children with malignancies as well. Table 2 lists the causes of chronic monoarthritis in childhood and distinguishes the sick from the well child.

Table 2 Chronic monoarthritis

Sick child	Well child
Partially treated septic arthritis	OJIA(Oligoarticular JIA)
TB	
Other infection-Lyme disease, Brucellosis	Enthesitis related arthritis
Vasculitis	Psoriatic arthritis
Sarcoidosis	Pigmented villo-nodular synovitis
Collagen vascular disease-eg SLE Malignancy	Mechanical injury/Foreign body e.g. plant thorn synovitis
Arthritis associated with other chronic diseases- IBD, Celiac disease	

Differential Diagnosis

How should One Clinically Approach a Child with Chronic Monoarthritis?

History Enquire about systemic symptoms such as fever, weight loss and night sweats. There are several causes of a child with fever and monoarthritis detailed in Table 3 Detailed history of morning stiffness, night pains and restriction of activities are important. History of a recent sore throat, gastroenteritis, red and painful eyes, chronic skin disease such as psoriasis or significant trauma should be asked for. A past history of tuberculosis (TB) or contact with an open case of TB is important in India, where monoarticular disease in a child is often considered to be TB unless proved otherwise. It is also important to check for history of recent travel to an area endemic for Lyme disease, Brucellosis or a history of tick bite [12, 13].

Examination Detailed general, systemic and local examination as previously outlined above including skin examination, formal ophthalmology evaluation by slit lamp for uveitis and musculoskeletal examination are a must in all children who present with a single swollen joint.

Investigations All children should get a

i. CBC, Peripheral smear, Coagulation profile, ESR and CRP
ii. A Monteaux test and a chest X -ray for TB. This is a routine for areas such as India where the burden of tuberculosis is high.
iii. ASLO titre/Lyme/Brucella serology according to history
iv. Bone marrow aspirate/biopsy—for infection / malignancy
v. ANA screen—has a low specificity and a high false positive rate. ANA positivity on its own does not suggest a diagnosis unless there is a background clinical correlation for arthritis/collagen vascular disease. When positive in the presence of OJIA [14], it is associated with an increased risk of uveitis. It is important to note here that TB can generate several antibodies- ANA, dsDNA, ANCA etc. Thus no laboratory test should be interpreted in isolation [15].
vi. HLA B 27 is a useful screen in children where a reactive arthritis or Enthesitis related arthritis are possible differentials

Table 3 What is the relevance of fever in chronic Monoarthritis?

Alerts to the possibility of partially treated septic arthritis
TB monoarthritis
Other systemic illness- SLE/Sarcoidosis/IBD
Other infection- Lyme/ Brucellosis
Malignancy
Children with OJIA rarely have fever/systemic symptoms

Radiology X-rays demonstrate presence of joint space widening if an effusion is present, though this is better detected by clinical examination in most cases. Joint space narrowing with erosions of the articular surfaces is characteristically seen in JIA. Presence of a Brodie's abscess is characteristic of osteoarticular TB and signs of Perthe's disease of hip can are also identified on a plain X-ray.

MRI depicts joint anatomy, shows early changes in cartilage and soft tissues, and with gadolinium contrast allows detection of synovitis It is also useful in detecting effusion, erosions, bone marrow edema, and peri articular changes.

Bone Scan is useful in picking up partially treated septic arthritis, juxta- articular osteomyelitis or in defining areas of abnormal uptake in the skeleton suggestive of leukemia.

What are Common Conditions with This Presentation, Their Management and Outlook?

Osteoarticular TB Osteoarticular TB occurs in approximately 5% of children with extra pulmonary tuberculosis [16–18].

It presents as a chronic monoarthritis by direct invasion into a joint or as a reactive arthritis termed Poncet's disease where the tubercular infection is at a distant site and the

joints are swollen as a reactive phenomenon. The latter is usually a polyarticular disease and seldom a differential in a child with chronic monoarthritis.

Osteoarticular TB is rare in the absence of pulmonary disease, insidious in onset and other systemic symptoms such as fever and night sweats are helpful but inconsistent. The child usually has significant pain as a result of muscle spasm around the involved joint. This is unusual in a child with JIA. Immunocompetent patients are usually Mantoux positive and contact history with TB is frequently obtained. X-rays of the involved joint show destruction of the joint architecture with cortical break down.

Definitive diagnosis is by synovial fluid culture of Mycobacterium TB (low yield) or PCR for Mycobacterium TB (low sensitivity, high specificity). Synovial biopsy demonstrates characteristic caseating granulomas.

Oligoarticular JIA (OJIA) Though OJIA can present with up to four inflamed joints, the monoarticular presentation is the most challenging and remains a diagnosis of exclusion. As per the ILAR classification, the joint should be involved for more than 6 weeks for the diagnosis to be made. These children are systemically well with characteristic morning stiffness and mild pain. In younger children the presentation is sometimes with a painless limp. If gastrointestinal symptoms such as oral ulcers, diarrhea or passage of blood in the stools are present or there is failure to thrive, consider inflammatory bowel disease or celiac disease.

Baseline tests are usually normal, as are early X-rays; later joint space reduction and or erosions may be evident. MRI will show synovitis and effusion.

OJIA can be managed with NSAIDS and Intra-articular steroids (upto 3 injections same joint in 12 months) of Triamcinolone hexacetonide/acetonide [19]. OJIA is termed persistent if persists beyond 6 months or extended if involves >4 joints after 6 months (associated with erosive chronic disease as in polyarticular). Except in the extended subcategory where the child will need methotrexate, articular prognosis is usually excellent in this subclass of JIA with 50–70% remitting spontaneously in a few years. Lack of aggressive approach with DMARDs in persistent / extended forms can lead to erosions and joint degeneration within 2 years of onset of disease [20].

ANA positivity is associated with higher incidence of uveitis which can become chronic and troublesome—hence all patients require regular screening ophthalmology visits. Inadequate management in early phase of arthritis can cause synovial hyper/hypotrophy leading to limb over/undergrowth and length discrepancies [21].

Pigmented Villonodular Synovitis(PVNS) A benign synovial hypertrophic condition, this is a rare cause of chronic monoarthritis [22, 23] in older children and young adults and affects girls more than boys. It presents as painless recurrent large joint effusion with no systemic signs and normal inflammatory markers. A joint aspiration shows blood stained fluid. The MRI is diagnostic in these patients where it shows hemosiderin deposits with dramatic synovial enhancement post gadolinium. PVNS can lead to joint deformity and early degeneration if not managed early. Treatment is initially intra-articular steroids, later surgical/ radioactive synovectomy.

What are The Uses and Indications for Joint Aspiration in Children with Monoarthritis?

Joint aspiration indications The most important indication in childhood is to diagnose septic arthritis /TB arthritis. Presence of hemarthrosis is helpful in diagnosis of coagulation disorders, synovial hemangioma and PVNS. The joint aspiration is rarely diagnostic in JIA where it shows an inflammatory joint fluid. It is usually performed aseptically with age appropriate analgesia. Fluoroscopic or ultrasound guidance may be needed for deep joints such as the hip joint. Crystal arthropathy does not occur in children and the joint fluid is thus not examined for crystals. Joint fluid analysis that distinguishes septic, inflammatory and non inflammatory fluid is detailed in Table 4.

Conclusions

The etiology of acute and chronic monoarthritis in childhood is diverse and detailed history and examination are essential. The presence of fever and systemic symptoms is helpful in both categories to plan further assessment and investigation.

Presence of red flag signs—denoting serious infection / malignancy demands urgent action. Monoarticular JIA is essentially a diagnosis of exclusion but identification and active management of this condition helps to prevent future disability.

Table 4 Synovial fluid characteristics [24]

Noninflammatory	Inflammatory	Septic	Hemorrhagic
>3.5	>3.5	>3.5	>3.5
High	Low	Mixed	Low
Clear	Cloudy	Opaque	Mixed
Straw/yellow	Yellow	Mixed	Red
200–2,000	2,000–75,000	>100,000	as blood
<25	>50	>75	as blood
Negative	Negative	Often positive	Negative

References

1. Roberton DM, South MJ. Arthritis and connective tissue disorders. In: Roberton DM, Robinson MJ, editors. Practical Pediatrics. 5th ed. London: Churchill Livingstone; 1994. p. 457.
2. Mohana-Borges A, Chung C, Resnick D. Monoarticular arthritis. Radiol Clin North Am. 2004;42:135–49.
3. Stimmler MM. Infectious arthritis: tailoring initial treatment to clinical findings. Postgrad Med. 1996;99:127–31.
4. Rice PA. Gonococcal arthritis: disseminated gonococcal infection. Infect Dis Clin North Am. 2005;19:853–61.
5. Copley J. Pediatric Musculoskeletal Infection: Trends and Antibiotic Recommendations. Am Acad Orthop Surg. 2009;17:618–26.
6. Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. J Bone Joint Surg Am. 1999;81:1662–70.
7. Aho K, Ahvonen P, Lassus A, Sievers K, Tiilikainen A. HLA antigen 27 and reactive arthritis. Lancet. 1973;2:157.
8. Carapetisa JR, Currie BJ. Rheumatic fever in a high incidence population: the importance of monoarthritis and low grade fever. Arch Dis Child. 2001;85:223–7.
9. Cabral DA, Tucker LB. Malignancies in children who initially present with rheumatic complaints. J Pediatr. 1999;134:53–7.
10. Cassidy JT, Petty RE. Textbook of pediatric rheumatology. 4th ed. Philadelphia: WB Saunders; 2001. 726–79.
11. Rodriguez-Merchan EC. HSS J. 2010;6:37–42.
12. Kalman S et al. Brucellae osteoarthritis on the Head of the Femur. J Trop Pediatr. 2005;51:250–1.
13. Rayen B, Chapman A. Monoarthritis: remember to ask the child. Arch Dis Child. 2005;69:1.
14. McCann LJ, Wedderburn LR, Hasson N. Juvenile Idiopathic Arthritis. Arch Dis Child Educ Pract Ed. 2006;91:29–36.
15. Ganesh R, Ramalingam V, Eswara Raja T, Vasanthi T. Antinuclear antibodies in Mycobacterium tuberculosis infection. Ind J Pediatr. 2008;75:1188.
16. Maltezou HC, Spyridis P, Kafetzis DA. Extra-pulmonary tuberculosis in children. Arch Dis Child. 2000;83:342–6.
17. Al-Matar MJ, Cabral DA, Petty RE. Isolated tuberculous monoarthritis mimicking oligoarticular juvenile rheumatoid arthritis. J Rheumatol. 2001;28:204–6.
18. Rajakumar D, Rosenberg AM. Mycobacterium tuberculosis monoarthritis in a child. Pediatr Rheumatol Online J. 2008;6:15.
19. Padeh S, Passwell JH. Intraarticular corticosteroid injection in the management of children with chronic arthritis. Arthritis Rheum. 1998;41:1210.
20. Mason T, Reed AM, Nelson AM, Thomas KB. Radiographic progression in children with polyarticular juvenile rheumatoid arthritis: a pilot study. Ann Rheum Dis. 2005;64:491–3.
21. Sherry DD, Stein LD, Reed AM. Prevention of leg length discrepancy in young children with pauciarticular juvenile rheumatoid arthritis by treatment with intraarticular steroids. Arthritis Rheum. 1999;42:2330–4.
22. Neubauer P, Weber K, Miller NH, McCarthy EF. Pigmented Villonodular Synovitis in Children: A Report of Six Cases and Review of the Literature. Iowa Orthop J. 2007;27:90–4.
23. Soifer T, Guirguis S, Vigorita V, Bryk E. Pigmented villonodular synovitis in a child. J Pediatr Surg. 1993;28:1597–600.
24. Ward PC. Interpretation of synovial fluid data. Postgrad Med. 1980;68(175–179):182–4.